

REMARKS

Claims 12 to 26 and 28 are pending in this application.

Claims 1 to 11 and 27 are canceled.

Applicants request reconsideration of the pending claims in light of the following remarks.

Claim Rejections under 35 U.S.C. §103(a)

The Examiner rejected claims 12-16 under 35 U.S.C. §103(a) as being unpatentable over Volant et al. (U.S. Patent No. 6,368,484) in view of Sun et al. (U.S. Patent No. 6,709,316). Specifically, the Examiner urged that even though Volant et al. does not show a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent, water and not including an abrasive, that Sun et al. shows exposing the barrier layer by chemical mechanical polishing using a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent, water and not including an abrasive (citing Sun et al., col. 6, lines 49-67, col. 7, lines 1-8, 30-67).

Applicants respectfully traverse this rejection.

While not acquiescing to the merit of the Volant et al. reference, applicants respectfully submit that Sun et al. does not support the deficiencies in Volant et al. and does not teach or suggest applicants' chemical mechanical polishing solution.

Specifically, the CMP composition in Sun et al. comprises:

... one or more chelating agents, one or more oxidizers, *one or more corrosion inhibitors*, and deionized water. The CMP composition may also further include one or more pH adjusting agents *and/or abrasive particles*. (Sun et al., col 6, lines 33-38).

Applicants submit that the CMP composition in Sun et al. requires at least one or more corrosion inhibitors. Applicants' claims do not include one or more corrosion inhibitors. Furthermore, Sun et al. discloses the optional use of abrasive particles, which applicants' invention (as provided in the claims) avoids.

In the framework of considering the prior art under 35 U.S.C. §103, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to full appreciation of what such reference fairly suggests

to one or ordinary skill in the art. As such, the prior art must be considered in its entirety, and not to ignore portions of the reference that leads away from obviousness.

Since applicants' CMP solution does not include one or more corrosion inhibitor, which is required in Sun et al., applicants' claims are not taught or suggested by the combination of Volant et al. in view of Sun et al. Moreover, in light of considering each of the references in its entirety, Sun et al. also teaches the optional use of abrasive particles. Even the Example of Sun et al. provides that the "first CMP composition may also include up to about 5 wt. % of abrasives." (See, Sun et al., at col. 11, lines 66-67). Accordingly, applicants respectfully submit that applicants' claims are not taught or suggested by Volant et al. in view of Sun et al.

For at least these reasons, applicants respectfully request reconsideration and withdrawal of the rejections of claims 12-16 under 35 U.S.C. §103(a) over Volant et al. in view of Sun et al.

The Examiner also rejected claims 17 and 28 under 35 U.S.C. §103(a) as being unpatentable over Volant et al. in view of Sun et al. and Chopra et al. (U.S. Patent No. 6,511,912). The Examiner urged that Chopra et al. shows the copper seed layer being formed by physical vapor deposition method as conventional in the art. With that being said, the Examiner urged that it would have been obvious to a person skilled in the art at the time of the invention to modify Volant et al. by specifying the copper seed layer being formed by physical vapor deposition as taught by Chopra et al. and the use of the solution taught by Sun et al. in order to avoid dishing and obtain a clean surface without any residue particles.

Applicants respectfully traverse this rejection.

While not acquiescing to the merit of the Volant et al. and Chopra et al. references, applicants respectfully submit that Sun et al. does not support the deficiencies in Volant et al. and Chopra et al., and does not teach or suggest applicants' chemical mechanical polishing solution as applicants argued above.

As provided above, applicants respectfully submit that the CMP composition in Sun et al. requires at least one or more corrosion inhibitors. Applicants' invention (as provided in their claims) does not include one or more corrosion inhibitors. Furthermore, Sun et al. discloses the optional use of abrasive particles, which applicants' invention (as provided in the claims) avoids.

Since applicants' CMP solution does not include one or more corrosion inhibitor, which is required in Sun et al., applicants' claims are not taught or suggested by the combination of

Volant et al. in view of Sun et al. Moreover, in light of considering each of the references in its entirety, Sun et al. also teaches the optional use of abrasive particles. Even in the Examples of Sun et al., it provides that the "first CMP composition may also include up to about 5 wt. % of abrasives." (See, Sun et al., at col. 11, lines 66-67). Accordingly, applicants respectfully submit that applicants' claims are not taught or suggested by Volant et al. in view of Sun et al.

For at least these reasons, applicants respectfully request reconsideration and withdrawal of the rejections of claims 17 and 28 under 35 U.S.C. §103(a) over Volant et al. in view of Sun et al. and Chopra et al.

The Examiner further rejected claims 12, 16 and 18-26 under 35 U.S.C. §103(a) as being unpatentable over Kaufman et al. (U.S. Patent No. 6,063,306) in view of Chan et al. (U.S. Patent No. 6,495,200) and Sun et al. (U.S. 2003/0022801). The Examiner urged that Kaufman et al. shows exposing the barrier layer by chemical mechanical polishing using a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent and water. The Examiner urged that Chan et al. shows the formation of the seed layer before forming the copper film. Further, the Examiner urged that Sun et al. discloses an abrasive-free solution. With that being said, the Examiner urged that it would have been obvious to a person skilled in the art at the time of the invention to modify Kaufman et al. by including the conventional seed layer as taught by Chan et al. and the abrasive-free solution as taught by Sun et al. to avoid dishing and erosion problems.

Applicants respectfully traverse this rejection.

While not acquiescing to the merit of the Chan et al. reference, applicants respectfully submit that Kaufman et al. and Sun et al. do not support the deficiencies in Chan et al., and does not teach or suggest applicants' chemical mechanical polishing solution.

Kaufman et al. discloses two chemical mechanical slurries that are used sequentially:

... a first chemical mechanical polishing slurry that is able to selectively polish the copper portion of a copper and tantalum or tantalum nitride containing substrate [; and] a second chemical mechanical polishing slurry that is able to selectively polishing the tantalum and/or tantalum nitride portion of a copper and tantalum and/or tantalum nitride containing substrate. (see, Kaufman et al., col. 3, lines 23-31).

Further, the chemical mechanical polishing slurry of Kaufman et al.

comprises an oxidizer, *an abrasive, a complexing agent, an organic amino compound*, and other optional ingredients. (see, Kaufman et al., col. 4, lines 29-32).

Applicants submit that the CMP composition in Kaufman et al. is patentability different than that of the instantly claimed CMP solution, and that Kaufman et al. does not teach or suggest applicants' claims. Kaufman et al. requires an abrasive. The fact that the office action directed applicants to Kaufman et al.'s teaching in col. 11, lines 1-5 is not determinative. The actual passage provides:

The first and second CMP slurries of this invention may be produced using conventional techniques known to those skilled in the art. Typically, the oxidizing agent and other non-abrasive components, are mixed into an aqueous medium, such as deionized or distilled water, at predetermined concentrations under low shear conditions until such components are completely dissolved in the medium. *A concentrated dispersion of the metal oxide abrasive, such as fumed alumina, is added to the medium and diluted to the desired loading level of abrasive in the final CMP slurry.* (see, Kaufman et al., at col. 10, line 65 to col. 11, line 7)(Emphasis added).

Clearly, Kaufman et al. requires an abrasive, not to mention other elements including a complexing agent and an organic amino compound, all of which are not found in applicants' claims. Accordingly, applicants respectfully submit that Kaufman et al. *teaches away* from applicants' invention in that Kaufman et al. clearly uses an abrasive.

Further, applicants respectfully submit that the CMP composition in Sun et al. requires at least one or more corrosion inhibitors. Applicants' claims do not include one or more corrosion inhibitors. Furthermore, Sun et al. discloses the optional use of abrasive particles, which applicants' invention (as provided in the claims) avoids.

The CMP composition of Sun et al. comprises:

at least one *reducing agent* for reducing ions of at least one transition metal to a lower valence state;
at least one pH adjusting agent;
at least one *metal corrosion inhibitor*;
and water.... (see, Sun et al., para [0022]-[0025])(Emphasis added).

Since applicants' CMP solution does not include at least one *reducing agent*, or at least one *metal corrosion inhibitor*, both of which are required in Sun et al., applicants' claims are not

taught or suggested by the Sun et al. Moreover, in light of considering each of the references in its entirety, Sun et al. also teaches the use of optional use of abrasive particles. The use of a small amount of abrasives in Sun et al. is found in at least paras. [0014], [0015], [0016], [0031], [0038], [0044], [0047], [0048], [0061], and [0066].

Accordingly, applicants respectfully submit that applicants' claims are not taught or suggested by Kaufman et al. in view of Chan et al. and Sun et al.

For at least these reasons, applicants respectfully request reconsideration and withdrawal of the rejections of claims 12, 16 and 18-26 under 35 U.S.C. §103(a) over Kaufman et al. in view of Chan et al. and Sun et al.

Double Patenting Rejection:

The Examiner rejected claims 12, 14-15, 17 and 28 under the judicially created obviousness-type double patenting doctrine over claims 1-6 of Lee et al. (U.S. Patent No. 6,610,596) in view of Kaufman et al. (U.S. Patent No. 6,603,306) and Chen et al. (U.S. Patent No. 6,495,200).

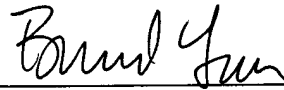
As provided in the last office action, applicants respectfully disagree with this double patenting rejection. However, to obviate this rejection, applicants will consider filing a terminal disclaimer, but respectfully request that such transmission be held in abeyance until the notification of allowable subject matter in this case.

Conclusion:

In summary, applicants respectfully submit that the instant application is in condition for allowance. Early notice to that end is earnestly solicited.

If a telephone conference would be of assistance in furthering prosecution of the subject application, applicants request that the undersigned be contacted at the number below.

Respectfully submitted,



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